NETL, LANL, and TNC Measure Terrestrial Carbon

Restoration projects in the Brazilian Atlantic Rainforest are ideal testing grounds for a new soil-carbon measuring device, largely because several areas have been reclaimed over the last 5 years.

A major problem in terrestrial sequestration is ***measurement***:

- How much carbon is stored in various ecosystems?
- How can the amount be monitored?
- How much does the amount change with changes in land use?
- How can the amount be increased?
- How much soil-based carbon is released into the air?
- How do you verify that carbon remains in an ecosystem?

One of the most exciting new developments in carbon measurement is a small, portable, laser instrument, developed by Los Alamos National Laboratory (LANL). Researchers can rapidly measure soil carbon using the laser-induced breakdown spectroscopy (LIBS) device. The instrument is much faster, more cost-effective, and probably less prone to sampling errors than collecting soil samples in the field and analyzing them in the laboratory by conventional analytical methods.

NETL is working with LANL and The Nature Conservancy (TNC) to develop new approaches to solving the carbon management issue in the United States and worldwide. The purpose is to develop breakthrough technologies and applications that can help sequester the release of CO_2 from fossil fuels through terrestrial carbon sequestration and carbon management.

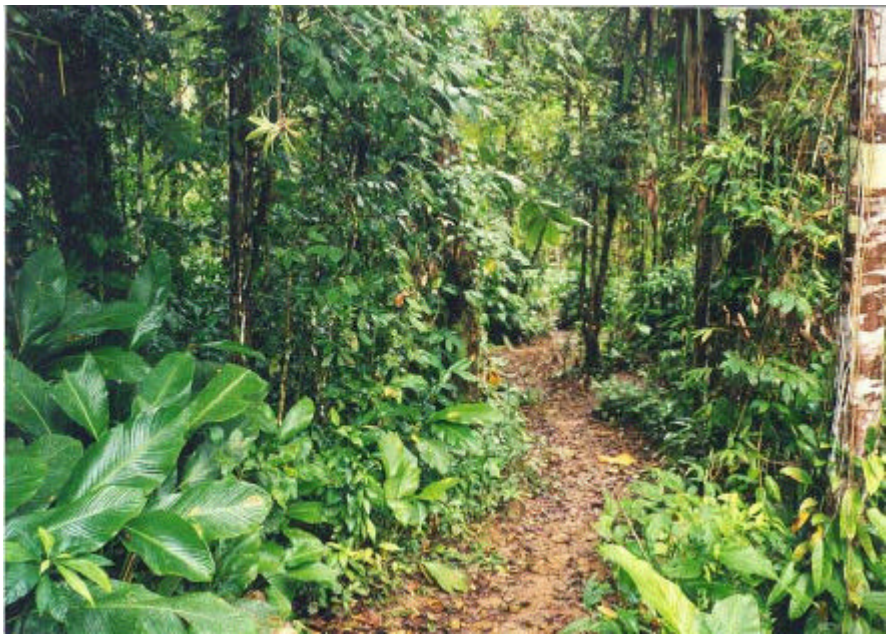
- The **Applied Terrestrial Carbon Sequestration Partnership**, led by NETL and LANL, is a multi-disciplinary team of scientists from both labs as well as from universities and other federal research organizations, such as the U.S. Department of Agriculture. The Partnership is taking a leading role in developing breakthrough technologies and applications for terrestrial carbon sequestration. Other collaborators include DOE's Office of Science, New Mexico State University, Northern Arizona University, the State of New Mexico, and the University of California.

- The **Climate Action Project Research Initiative** is a cooperative agreement between NETL and TNC. The project was mentioned in a July 13, 2001 press release from the White House and an October 1, 2001 State Department speech as an example of what the Administration is doing to mitigate Climate Change. The overall objective is to refine the tools and methodologies for cost-effective, verified measurements of the long-term potential of various carbon sequestration and land use emissions avoidance strategies, using real projects as proving grounds.

Both partnerships are working with several government and non-government organizations in Brazil, including The Society for Wildlife Research (SPVS), the University of São Paulo, and Brazil's Department of Environment and Agriculture (EMBRAPA). They are planning a workshop in Brazil on LIBS measurement of soil carbon and expanding those measurements into carbon inventories.

Vegetation and soils are natural carbon storage sinks: the global biosphere absorbs about 2 billion tons of carbon annually (2 Gt), but the inventory of carbon stored in roots and soils

equates to roughly 1,000 years of annual absorption, or 2 Tt of carbon. Policy makers are looking to terrestrial sequestration (removal of CO_2 from the atmosphere and storage in terrestrial ecosystems) as an option for reducing net greenhouse gas emissions while at the same time restoring natural environments for plants and wildlife, reducing runoff, and increasing domestic production of agriculture and forest products.



This is part of a restoration project in the Brazilian Atlantic Rainforest, which shows medium-age forest growth. NETL, LANL, and TNC are cooperating with Brazilian organizations to test terrestrial carbon sequestration strategies.

Carbon data for larger trees is needed. Researchers use destructive sampling—measuring the diameter, crown diameter, and height of the tree while standing, and then harvesting and weighing the entire tree.